DOCUMENT RESUME

ED 030 747 VT 008 804

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Requirements and Opportunities for Entry Workers in the Occupation of Producing and Marketing Ornamental Nursery and Greenhouse Specialists.

Spons Agency-Texas A and M Univ., College Station. Agricultural Experiment Station. Texas Occupational Research Coordinating Unit, Austin.

Pub Date Jun 69

Note-20p.

EDRS Price MF-$0.25 HC-$1.10

Descriptors-*Educational Needs, Employer Attitudes, *Job Skills, *Nursery Management, *Nursery Workers (Horticulture), *Occupational Information, Ornamental Horticulture, *Vocational Education

Identifiers-*Texas

To determine what should be taught to persons preparing for employment in the horticultural industry, 30 nursery owners or operators in five geographic areas of nursery concentration in Texas were interviewed. The specific objectives were to determine: (1) the most important competences, (2) the influence of geographic location and size of business upon needed competencies, (3) occupational information for students, and (4) the effect of geographic location and size of business upon length of work week and hourly wages. Analyses of variance and t-test were used in the analysis. The most important competencies were identified in areas of: (1) Identifying Ornamental Plants, (2) Work Relations, (3) Nursery Crop Production, (4) Controlling Plant Insects and Diseases, (5) Merchandising Horticultural Plants and Supplies, (6) Plant Growing Media, and (7) Constructing, Maintaining, and Using Plant Growing Structures. Significant differences existed in the degrees of importance assigned to these seven competency areas among nursery men in the five areas of Texas studied. Persons choosing horticulture as an occupational field must be prepared to work long hours at low wages for a considerable period of time before they can hope to obtain managerial positions. (DM)

EDO 30747

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OFFICE OF EDUCATION

REQUIREMENTS AND OPPORTUNITIES FOR ENTRY WORKERS IN THE OCCUPATION OF PRODUCING AND MARKETING ORNAMENTAL NURSERY AND GREENHOUSE SPECIALTIES

by

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Sponsored Cooperatively
Occupational Research Coordinating Unit
Texas Education Agency
and
Texas Agricultural Experiment Station
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June, 1969

VT008804

FOREWORD

This report is of an investigation conducted at the request of Mr. George Hurt, Director of Agricultural Education, Texas Education Agency. The need for the study was created when pre-employment laboratory programs in ornamental horticulture were established as a part of vocational agriculture in public schools in Texas. What should be taught was the basic question confronting teachers and administrators of the program.

Course content is of vital importance for programs designed to prepare persons for occupational competence. It is generally believed among vocational educators that the most valid source of content is the business or occupation for which training is being offered. Therefore, nursery managers were interviewed to determine what should be taught to persons who plan to seek employment in the industry to the end that they could enter employment and make satisfactory progress in their chosen occupation.

The major portion of the investigation was conducted by Dr. Johnny M. Johnson, Assistant Professor at Tarleton State College. The research was supported by funds from the Texas Agricultural Experiment Station as a part of Project S-1653, and from the Occupational Research Coordinating Unit of the Texas Education Agency.

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REQUIREMENTS AND OPPORTUNITIES FOR ENTRY WORKERS IN THE OCCUPATION OF PRODUCING AND MARKETING ORNAMENTAL NURSERY AND GREENHOUSE SPECIALTIES

Purpose

The primary purpose of the investigation was to establish a basis for the development of courses of study to be used at the secondary level to prepare prospective employees for employment in the field of ornamental horticulture. To this end, the following specific objectives were formulated:

1. To determine the competences believed by employers to be most important for persons entering the business of producing and marketing ornamental nursery and greenhouse specialties.
2. To determine the influence of geographic location and size of business upon groups of related competences.
3. To obtain information that will be useful to persons considering a career in the occupational field of ornamental horticulture.
4. To determine the effect of geographic location and size of business upon length of workweek and hourly wages paid to beginning workers.
5. To develop a basis for a publication to be used for counseling students who consider employment in the field of ornamental horticulture.

Procedure

The sample consisted of 30 nursery owners or operators chosen from the five geographic areas of nursery concentration in Texas; namely, Tyler, Harlingen,

Fort Worth-Dallas, Houston, and San Antonio. The sample comprised 13.4 percent of the 224 general line-out nursery growers in Texas. The nurseries were divided into two groups according to the number of acres of nursery stock. Nurseries consisting of ten or more acres were classified as large nurseries, and those with nine or less acres were classified as small nurseries. Numbers, sizes, and locations of nurseries were chosen from the 1967 copy of Texas Nursery and Florist Directory, published by the Texas Department of Agriculture.

Two sets of hypotheses were developed and tested by analysis of variance and t-tests to determine differences in responses. Hypotheses, tested at the .01 level of probability, were:

1. There is no difference between responses among the five geographic locations.

2. There is no difference between responses from tne two sizes of businesses.

Data were obtained by personal interviews with nurserymen. Seventeen competence groups and related competences within each group were developed by reviewing literature and consulting horticultural experts. Nurserymen were asked to indicate a degree of importance for each competence within the 17 groups on a scale of one through four. The responses for the related competences were averaged to give an importance rating to the competence group. The groups of related competences were then placed in one of three priority levels according to the mean of all items which comprised that particular group. The scale used to determine degrees of importance for competences was:

4 - MOST IMPORTANT: Worker very frequently uses content of subject matter area.

3 - IMPORTANT: Worker often uses content of subject matter area.

2 - OF SOME IMPORTANCE: Worker sometimes uses content of subject matter area.

1 - UNIMPORTANT: Worker does not use content of subject matter area.

Using the above scale, the following priority levels were arbitrarily established: Priority Level I, most important; Priority Level II, second in importance; and Priority Level III, third in importance. Competence groups which received a mean rating of 3.00 or above were placed in Priority Level I. Priority Level I competence groups should receive the highest priority in developing content for courses in ornamental horticulture.

Those competence groups receiving a rating of 2.00-2.99 were placed in Priority Level II. These groups would be taught in a horticultural course after provisions had been made to teach the subject matter included in Priority Level I. Those competence groups receiving a rating of less than 2.00 were placed in Priority Level III. None of the competences in Priority Level III would be taught if it meant the omission of any subject matter in the first two levels.

Presentation of Data

The primary purpose of the investigation was to identify those competences considered by employers to be most important for entry level workers; however, competences assigned to all three priority levels are included in this report.

Priority Level I Competences (most important)

Seven of the 17 competence groups received ratings high enough to be placed in Priority Level I. The groups and the individual competences within the groups are presented as follows according to the levels of importance assigned to each by nurserymen.

1. Identifying Ornamental Plants
    a. Identification of trees (common names)
    b. Identification of flowers and bulbs (common names)
    c. Identification of evergreen shrubs (common names)
    d. Identification of ground covers and border grasses (common names)
    e. Identification of deciduous shrubs (common names)
    f. Identification of foliage and greenhouse plants (common names)
    g. Plant characteristics used in identification (plant parts)
    h. Plant classification system (the plant kingdom)
2. Work Relations
    a. Relations with fellow workers (courtesies and responsibilities on the job)
    b. Relations with superiors (responsibilities of employer and employee)
    c. Maintaining good relations with customers (how to meet customers)
    d. Personal grooming (how to dress for the job)
    e. Wage laws (laws which affect employees)
3. Nursery Crop Production
    a. Fertilization for nursery crops (nursery crop requirements)
    b. Planting and transplanting nursery crops (principles involved in handling and planting)

c. Container growing (principles of growing plants in containers)

d. Watering, misting, and irrigating nursery crops (systems of providing moisture)

e. Weed control for nursery crops (methods of control)

f. Digging field grown plants (principles of removing plants)

g. Taking inventory of nursery crops (how to count and record plants and prices)

h. Pruning and root pruning nursery crops (techniques of pruning)

i. Cultivating nursery crops (systems of cultivation)

j. Labeling nursery crops (labeling so that records can be kept)

k. Rotation of nursery crops (principles of rotation)

l. Mulches for nursery crops (principles of mulching nursery crops)

4. Controlling Plant Insects and Diseases

a. General symptoms of plant diseases (how to recognize common plant diseases)

b. Control of diseases of ornamental trees and shrubs (methods of control)

c. Use of insecticides on ornamentals (methods of handling, mixing, and applying)

d. Application equipment (all types of applicators)

e. Identifying common insects (recognizing common pests)

f. Treating soil for nematode control (detection and eradication of nematodes)

g. Sanitation for disease control (methods of preventing contamination)

5. Merchandising Horticultural Plants and Supplies

a. Pricing (how to determine selling price)

b. Fundamentals of presenting a product (methods of showing product to customers)

c. Keeping inventories (how to keep up with stock on hand)

d. Types of customers (explanation of customer types)

e. Displaying products (arranging crops for sale)

f. Functions of the different type mearkets (market channels for crops)

g. Advertising (how to set up various types of advertising)

6. Plant Growing Media

a. Media preparation (preparing media)

b. Maintaining soil fertility level (determining and maintaining media fertility)

c. Effect of soil organisms on plant growth (how various organisms affect plants)

d. Watering practices as they relate to soil structure (ways in which watering affects plants)

e. Determining the suitability of various soil materials for growing plants (selecting media for plants)

f. Using soil mulches (principles of selecting and using mulches)

7. Constructing, Maintaining, and Using Plant Growing Structures

a. Transplanting seedlings and cuttings in the greenhouse (moving plants in the greenhouse)

b. Soil sterilization (chemical)

c. Heating the greenhouse (principles of heating)

d. Cooling the greenhouse (principles of cooling)

e. Greenhouse equipment (all equipment, such as air circulators, etc.)

f. Construction and use of lath house (principles of using lath houses)

g. Types of greenhouses (material types)

The following is a list of competences classified as miscellaneous which were among the most important competences for entry workers but were in groups that did not receive Priority Level I ratings when all items in the group were averaged.

8. Miscellaneous

   a. Ways to utilize cuttings (plant propagation)

   b. Principles of grafting (plant propagation)

   c. Principles of budding (plant propagation)

   d. Division of tubers and crowns (plant propagation)

   e. Principles of pruning trees (arboriculture)

   f. Conditioning and maintaining hand tools (power and equipment)

   g. Safety practices (power and equipment)

   h. Maintenance and repair (power and equipment)

The following information was summarized from the analyses of variance and t-tests which were applied to each of the seven competence groups falling into Priority Level I. Since statistical calculations were made by groups, the miscellaneous items were not treated.

1. Significant differences exist in the degrees of importance assigned to IDENTIFYING ORNAMENTAL PLANTS among the locations and the sizes of businesses studied. Nurseries in the Houston and Harlingen areas placed more emphasis on this competence group than did other nurseries. Large nurseries considered this competence group to be more important than did small nurseries.

2. Significant differences exist in the degrees of importance assigned to WORK RELATIONS among the geographic locations studied, but not between the sizes of

businesses studied. Houston nurserymen placed more emphasis on this competence group than did the other nurserymen interviewed.

3. Significant differences exist in the degrees of importance assigned to NURSERY CROP PRODUCTION among the geographic locations studied, but not between the sizes of nurseries. Nurserymen in the Tyler, Harlingen, and Fort Worth-Dallas areas placed more importance on this competence group than did operators in the Houston and San Antonio areas.

4. Significant differences exist in the degrees of importance assigned to CONTROLLING PLANT INSECTS AND DISEASES among the geographic locations studied, but not between the sizes of businesses studied. The nurserymen in the San Antonio and Harlingen areas placed more importance on this competence group than did nurserymen in the other areas.

5. Significant differences exist in the degrees of importance assigned to MERCHANDISING HORTICULTURAL PLANTS AND SUPPLIES between business sizes and among the geographic locations. Nurserymen in the Houston and Fort Worth-Dallas areas placed more importance on this competence group than did other nurserymen. Nurserymen in small businesses considered the competence group to be more important than did large operators.

6. Significant differences exist in the degrees of importance assigned to PLANT GROWING MEDIA between the two business sizes and among the geographic locations studied. The highest degrees of importance were assigned by San Antonio and Fort Worth-Dallas nurserymen. Large businesses assigned higher degrees of importance than did small businesses.

7. Significant differences exist in the degrees of importance assigned to CONSTRUCTING, MAINTAINING, AND USING PLANT GROWING STRUCTURES between the sizes of businesses studied and among the geographic locations studied. Nurserymen in the Harlingen and Fort Worth-Dallas areas placed higher degrees of importance on this competence group than did nurserymen in the other areas. Small nurseries placed more importance on this competence group than did large nurseries.

Priority Level II Competences (second in importance)

Seven of the 17 competence groups received ratings high enough to be placed in Priority Level II. Following are the groups and the individual competences within the groups. Groups and competences are presented in the order of importance assigned to them by nurserymen.

1. Propagating Horticultural Plants
    a. Cuttings (ways to utilize cuttings)
    b. Grafting (principles of grafting)
    c. Budding (principles of budding)
    d. Division (tubers and crowns)
    e. Media sterilization (methods)
    f. Seed germination (how seeds grow)
    g. Seed treatment (methods of improving productivity)
    h. Layering (principles of layering)
    i. Separation (bulbs)
    j. Collecting seed (harvesting)
    k. Cleaning seed (screening)

2. Arboriculture

   a. Pruning trees (principles of pruning)

   b. Insect control (recognizing and controlling insects)

   c. Transplanting trees (principles of moving trees)

   d. Tree diseases and their control (recognizing and controlling)

   e. Spraying equipment and practices (spraying trees)

   f. The soil and its relation to trees (how soil affects trees)

   g. Treating tree wounds (methods of treating)

   h. Cavity treatments (how to stop cavity decay)

   i. Bracing and cabling (methods of installing)

3. Operating, Repairing, and Maintaining Small Power and Other Tools and Equipment

   a. Conditioning and maintaining hand tools

   b. Safety practices

   c. Maintenance and repair of equipment

   d. Types of equipment

   e. Welding (gas)

   f. Welding (electric)

4. Floral Crop Production

   a. Planting and transplanting floral crops (procedures used for floral crops)

   b. Moisture (water-humidity) for floral crops (moisture requirements for plants)

   c. Soil preparation for floral crops (soil properties necessary for floral crops)

   d. Foliage plants (types and varieties)

e. Temperatures for floral crops (requirements for major crops)

f. Bedding plants (types and varieties)

g. Light requirements for floral crops (amount and intensity of light needed by plants)

h. Nutrition for floral crops (fertilization requirements)

i. Aeration of floral crops (air movement)

j. Floral crop rotation (systems of rotation)

k. Flowering pot plants (types and varieties)

l. Cut flower crops (types and varieties)

5. Establishing and Caring for Lawns and Turfs

a. Maintenance of the lawn (recognizing insect, moisture, and mineral difficulties)

b. Fertilization of the lawn (determining needs and methods of application)

c. Method of planting the lawn (principles of establishing a lawn)

d. Renovating the lawn (how to take a lawn in poor condition and make recommendations for upgrading)

e. Choosing a desirable grass (determining grass for the situation)

f. Preparing soil for the lawn (soil requirements for turf development)

6. Water Systems and Plumbing

a. Nursery irrigation (principles of irrigation)

b. Sources of water supply (principles of choosing a water supply)

c. Selection of pumps (selecting pumps for certain tasks)

d. Planning plumbing layout (laying out pipe and outlet system)

e. Location and installation of pumps (placing and installing)

7. Developing the Landscape Design or Plan

a. Preparing a landscape plan for the homegrounds (selecting and placing plants on a landscape plan)

b. Preparing a landscape survey (use a survey instrument to determine slopes and distances)

c. Methods and procedures for grading homegrounds (methods of leveling and grading)

The following information was summarized from the analyses of variance and t-tests which were applied to each of the seven competence groups falling into Priority Level II.

1. Nurserymen from all localities placed about the same degrees of importance on PROPAGATING HORTICULTURAL PLANTS. Nurserymen in large businesses placed more importance on this competence group than did nurserymen in small businesses.

2. Size of business seemed to have little influence on the degrees of importance assigned to ARBORICULTURE. Harlingen nurserymen placed more importance on this competence group than did nurserymen from Houston, San Antonio, Tyler, and Fort Worth-Dallas, respectively.

3. Neither size of business nor geographic location seemed to have significant effects on the degrees of importance assigned to OPERATING, REPAIRING, AND MAINTAINING SMALL POWER AND OTHER TOOLS AND EQUIPMENT.

4. Small businesses placed more value on FLORAL CROP PRODUCTION than did large businesses. Tyler nurserymen placed a significantly higher level of

importance on this competence group; there was no significant difference in the degrees of importance assigned by nurserymen among the other four locations.

5. Size of business did not affect to a significant degree the importance assigned to ESTABLISHING AND CARING FOR LAWNS AND TURFS. Nurserymen from the Houston area placed the most emphasis on the competence group followed by Tyler, Harlingen, Fort Worth-Dallas, and San Antonio, respectively.

6. Small businesses placed a significantly higher level of importance on WATER SYSTEMS AND PLUMBING than did large businesses. Geographic location had no apparent effect on the degree of importance assigned to this competence group.

7. Size of business did not affect the degrees of importance assigned to the competence group of DEVELOPING THE LANDSCAPE DESIGN OR PLAN. Nurserymen from the Houston area assigned a significantly higher level of importance to this competence group than did nurserymen from the other four geographic locations. Harlingen nurserymen assigned the second highest level of importance followed by nurserymen in Fort Worth-Dallas, Tyler, and San Antonio, respectively.

Priority Level III Competences (third in importance)

Only three of the 17 competence groups received ratings low enough to be placed in Priority Level III. Following are the groups and individual competences within each group according to the degrees of importance assigned to them by nurserymen.

1. Small Building Construction

    a. Principles of good construction (common rules for adequate strength)

b. Cost and types of building materials (figuring bills of cost for different types of materials)

c. Methods of laying out buildings (placing buildings)

d. Interpreting blueprints (reading blueprint plans for construction)

e. Concrete work (principles of using concrete)

f. Cutting rafters (measuring and cutting rafters)

2. Electricity

a. Electrical controls (automatic controls)

b. Location of power entrance (placing breakers and loop)

c. Figure load and size of entrance cable and switch box (determining wire and box size)

d. Selection of electrical motors (principles of selecting electrical motors)

3. Floral Design

a. Holding flowers (ways to protect plants)

b. Stemming flowers (principles of stemming)

c. Picking flowers (principles of cutting)

d. Basket arrangements (principles of making)

e. Large vase arrangements (principles of designing)

f. Small vase arrangements (principles of designing)

g. Table arrangements (principles of designing)

h. Rose corsage (how to design)

i. Color harmony (how to balance colors)

j. Funeral sprays (how to design)

k. Casket covers (how to design)

l. Spray bow (tying)

m. Tailored bow (tying)

n. Butterfly bow (tying)

o. Corsage bow (tying)

p. Placement of greens and wreaths (where to put wreaths)

q. Cluster wreath (how to design)

r. Ribbon-wrapped wreath (how to design)

s. Carnation corsage (how to design)

t. Wrist corsage (how to design)

u. Fan bouquet (how to design)

v. Cascade bouquet (how to design)

w. Gardenia corsage (how to design)

x. Camellia corsage (how to design)

The following information was summarized from the analyses of variance and t-tests which were applied to each of the three competence groups falling into Priority Level III.

1. Neither size of business nor geographic location seemed to affect significantly the degrees of importance assigned to SMALL BUILDING CONSTRUCTION.

2. Size of business seemed to have no effect on the degrees of importance assigned to the competence group of ELECTRICITY. Houston nurserymen placed the most emphasis on the competence group followed by Tyler, San Antonio, Fort Worth-Dallas, and Harlingen, respectively.

3. Small businesses placed more emphasis, to a significant degree, on FLORAL DESIGN than did large businesses. Tyler nurserymen placed a significantly higher

degree of importance on this competence group than did nurserymen from the other four geographic locations.

Occupational Information

In addition to the collection of data regarding competences, occupational information was obtained which was believed by the investigator to be of value to persons interested in ornamental horticulture careers. A summary of the information follows:

1. The most commonly found job classifications in the industry are:
   a. Manager
   b. Common laborer
   c. General worker
   d. Greenhouse worker
   e. Field worker
   f. Plant propagator
   g. Ball and burlapper
   h. Landscape foreman
2. Willingness to work and learn is more important in obtaining jobs than a high school diploma.
3. Entry level workers are paid an average hourly wage of $1.50 with a range of $1.40 to $2.00.
4. Vacation and sick leave days are negotiable between employers and employees. No established policy seems to exist within the industry.

5. Large businesses, in general, pay higher wages to beginning workers than do small businesses.

6. Nurseries near the large metropolitan areas pay higher beginning wages than do the nurseries in the small metropolitan areas.

7. Length of workweek varies significantly among businesses in the five geographic locations with an average of 44 hours per week. Nurseries near the large metropolitan areas require workers to work more hours per week than do nurseries in the small metropolitan areas.

8. Length of workweek does not vary significantly between sizes of businesses.

9. All beginning horticultural workers are expected to enter employment at the fieldman, greenhouse worker, or general worker level.

10. Persons choosing horticulture as an occupational field must be prepared to work long hours at low wages for a considerable length of time before they can hope to obtain managerial positions.

Recommendations

The following recommendations are based upon data obtained and analyzed in this study and are directed toward alleviating problems caused by lack of curriculum and occupational materials.

1. A course of study for prospective horticultural workers should be developed using the findings of this investigation.

2. Investigations should be made to provide a basis for curriculum materials for other phases of the horticultural industry.

3. Investigations should be made of the opinions and attitudes of workers concerning working conditions and requirements in the horticultural industry. This investigation was limited to the views of managers.

4. Investigations should be made to determine the manpower requirements of the horticultural industry.